



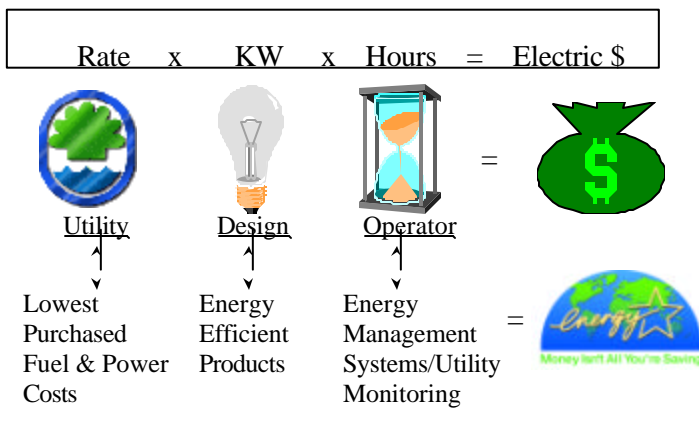
Walt Disney World's Energy Star Program

Sustainable Energy Management – Walt Disney World's Approach

Paul J. Allen, P.E.
Reedy Creek Energy Services
Walt Disney World



Energy Fundamentals





Energy Cost Example Increase Efficiency



X



X



=



60 watt Incandescent

$$\$0.066/\text{Kwh} \times 0.06 \text{ Kw} \times 8760 \text{ Hrs} = \$ 34.69$$

15 Watt Compact Fluorescent

$$\$0.066/\text{Kwh} \times 0.015 \text{ Kw} \times 8760 \text{ Hrs} = \$ 8.67$$



Energy Cost Example Reduce Hours

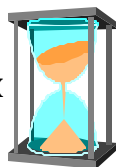


X

60 Hp Motor



X



=



24 Hrs/Day Operation

$$\$0.066/\text{Kwh} \times 45 \text{ Kw} \times 8760 \text{ Hrs} = \$ 26,017$$

16 Hrs/Day Operation

$$\$0.066/\text{Kwh} \times 45 \text{ Kw} \times 5840 \text{ Hrs} = \$ 17,344$$



Energy Star Buildings Program

1. Green Lights Upgrades

2. Building Tune-Up

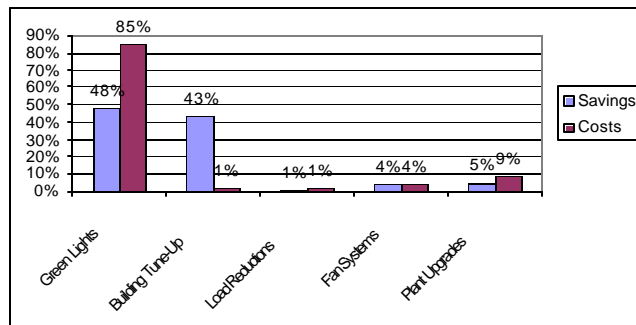
3. Load Reductions

4. Fan System Upgrades

5. Heat and Cooling Plant Upgrades



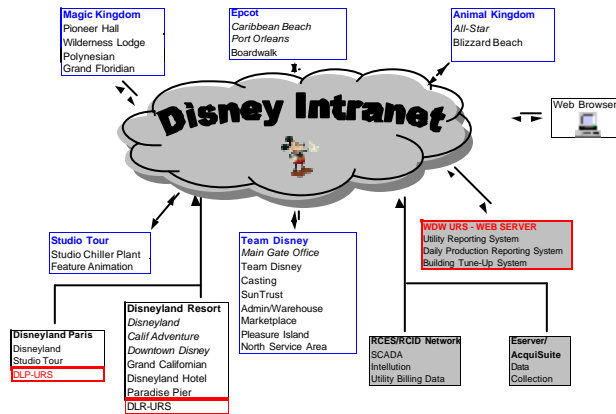
Energy Star Results



Overall Program Results – 44% IRR



Walt Disney World Energy Management System



Energy Management Field Panels





Chilled Water Plant



Electric Sub-Meters





Energy Information System

- **Server Programs**

- Windows NT Server
- Internet Information Server (IIS)
- Microsoft Visual Foxpro
- Foxweb (www.foxweb.com)
- KavaCharts (www.ve.com)
- Autotask 2000 (www.cypressnet.com)



- **Client Programs**

- Netscape
- Internet Explorer



Utility Reporting System (URS)

- **Intranet Database Program**

- Use web browser to graph and report utility usage

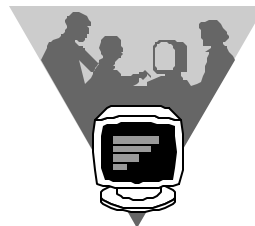
- **Monthly Billing Data**

- Utility bill data downloaded monthly from utility

- **Hourly Interval Data**

- Power monitoring systems
- Energy management systems
- Other submetering systems

- **URS Demo**





Building Tune-Up Process

- **Tune-Up HVAC Control System**

- Optimize time/setpoint schedules
- Auto-reset daily
- Understand energy management system control strategies

- **Repair Controls that have Failed**

- Control valves, dampers and sensors

- **Measure Utility Consumption**

- Track monthly utility bills
- Install submetering strategically
- Publish the data on an Intranet



Building Tune-Up BTU Team Structure

- **Facilitator**

- Energy Management Engineer

- **Team Leaders**

- Maintenance/Engineering Services
- Productivity Manager

- **Members**

- Operations
- EMS Vendor Support (if needed)





Building Tune-Up System (BTUS)

- **Energy Management System**

- HVAC Equipment
- Time Schedules
- Setpoint Schedules
- Link to Temp/RH Trends

- **Facility Time Schedule Program (FTS)**

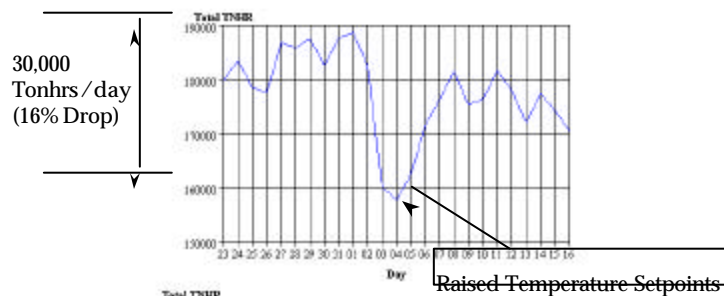
- Nightly Download of Time and Setpoint Schedules

- **BTUS Demo**



Epcot's Building Tune-Up

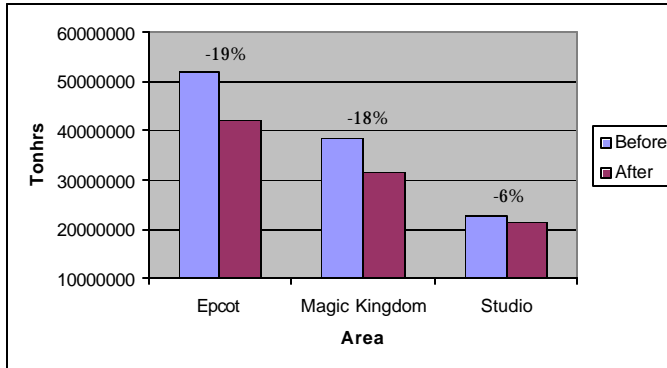
DAILY TOTAL Graph of THER PROFILE for Subarea: BEEP-PLANT-CW; BEEP-PLANT-CW



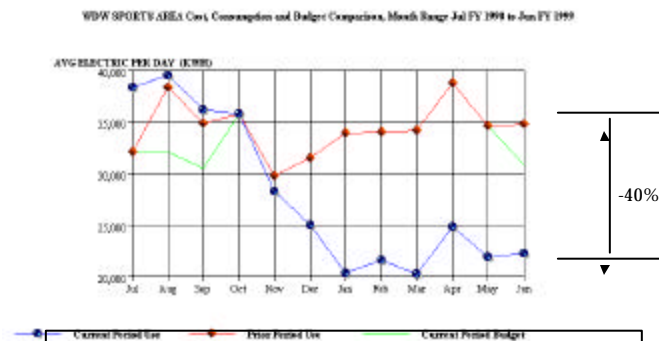
Lesson Learned: Slow & Steady Wins the Race



Chilled Water Savings



Sports Complex Energy Saving Mods

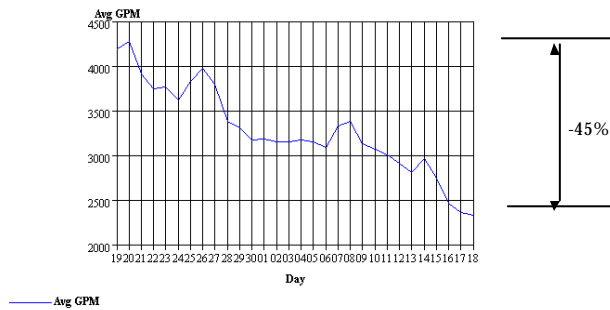


Installed VSD on HVAC Units, Optimized Control Algorithms, Used CO2 Sensors to Control Outside Air



Coronado Springs Chilled Water Flow

HOUR(S) 1-24 Graph of GPM PROFILE for Subarea; CORONADO SPGS; CHILLER PLANT

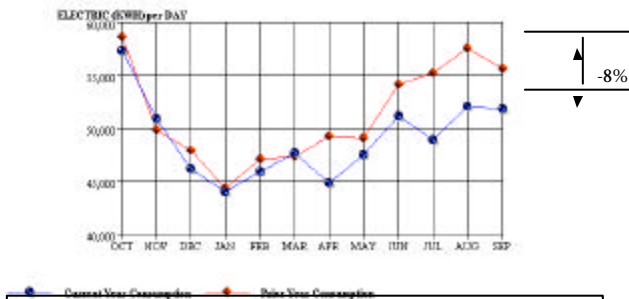


Repaired Chilled Water Valves – Reduced Flow



Coronado Springs HVAC Mods

CONVENTION COMMERCIAL CENTER Subarea Billing Data FY 2001

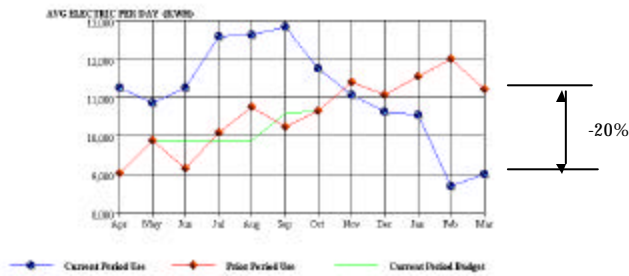


Installed Chiller Plant Monitoring System, CO2 Sensors on HVAC units to Control Outside Air



Cirque du Sol BTU

CIRQUE DU SOL AREA Clerk, Consumption and Budget Comparison, Month Range Apr FY 2009 to Mar FY 2011



Used Energy Management System to Turn off HVAC units at night. Raised Temperature Setpoints.



Project Tracking System (PTS)

- **Energy Management Project Database**
 - Project Scope
 - Date Completed
 - Energy/Dollar Savings
- **Management Reporting**
 - Project Summary Report
 - Calculation Backup
- **PTS Demo**





Green Lights Project

- 16.7 Millions SF Upgraded
- Annual Savings: 46 Million Kwh
- IRR - 24%



Living Seas Tank Lighting



Before - 1000W Fixtures

After - 250W & 400W Fixtures





Living Seas Tank Lighting

HOUSES 13-18 - Division = PARKS - Area = EPCOT
SUBAREA = SEAS

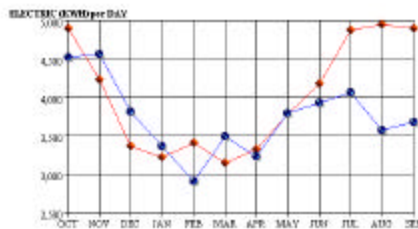


50 KW



Energy Star Projects VSD Motor Controls

608 SVCAMORE STREET Subarea Billing Data FY 1999



-23%

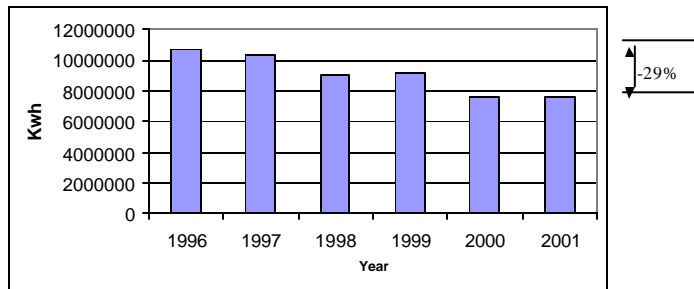
Current Year Consumption Prior Year Consumption

Celebration Building C2 - Installed Variable Speed Drives on condenser water pumps.



Compressed Air Optimization

CEP Air Compressor Electric Consumption



Repaired Air Miser Controls, Fixed Compressed Air Leaks.
3 Million Kwh Annual Reduction

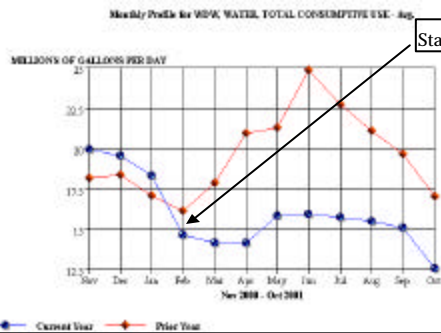


Air Compressor Controls





Daily Production Report Water Savings Reductions



Start Water Restrictions

Water Savings:

- 2 Billion
Gallons
- 28% Reduction

Used Reclaim Water for Cooling Towers, Park Wash Down,
Reduced Irrigation Frequency.



Energy Star Team

- Meets Monthly on 1st Friday
- Share ideas to reduce utility costs
- Vendor Presentations
- Energy Management Training





Energy Star Awards

- Recognize the “Stars” of Energy Conservation
- Provides “Competition” between Areas
- Areas are ranked - % reduction from Prior Year
- Report is generated using Utility Reporting System
- Yearly awards



Energy Star Awards Report

AREA	ELEC (KWH)	CHW (T-HR)	HW (BTU)	GAS (THM)	WAT (GAL)	SEWR (GAL)	REF (\$)	PCT CHG
Grand Fl	-0.27	-3.23	0.00	-10.20	-0.71	-8.12	-22.58	-4.58
Caribbean Beach	0.99	0.00	0.00	7.89	-11.29	-10.38	-3.81	-2.14
Yacht & Beach	-0.44	0.00	0.00	-7.39	-1.13	-5.74	7.69	-1.68
Polynesian	2.87	9.65	0.00	-2.55	-17.24	-21.69	2.18	-0.43
Contemporary	-1.56	-1.41	8.47	-0.62	-8.95	-8.95	-9.22	-0.03
Dixie Landings	-0.31	0.00	0.00	-3.85	6.40	13.27	-3.43	2.28
Village Resorts	2.65	0.00	0.00	-13.69	8.11	6.34	-100.0	3.10
Ft. Wilderness	11.44	0.00	0.00	28.87	-3.70	-3.70	-10.41	4.77



Future Projects

- **Utility Analysis Program (UAP)**
 - Utility usage by facility type
 - Load profiles
- **Chiller Plant Delta-T Improvement**
 - Delta-T and Flow daily report



Utility Reporting System

